



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,927	03/02/2004	Matthew J. Carey	HSJ920030268US1	3829

44425 7590 01/22/2007
THOMAS R. BERTHOLD
18938 CONGRESS JUNCTION COURT
SARATOGA, CA 95070

EXAMINER

KAYRISH, MATTHEW

ART UNIT	PAPER NUMBER
----------	--------------

2627

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/791,927

Applicant(s)

CAREY ET AL.

Examiner

Matthew G. Kayrish

Art Unit

2627

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-15 and 17-21 is/are rejected.
- 7) ☒ Claim(s) 3 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

Claims 1, 2, 5-9, 15 and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al (US Publication Number 2002/0048690).

Regarding claim 1, Fukuzawa et al disclose:

An antiferromagnetically exchange-coupled structure in a magnetic device of the type having a substrate and a plurality of ferromagnetic layers, the structure being formed on the substrate and comprising:

An underlayer (figure 17, item 142) formed of a substantially chemically-ordered alloy having a tetragonal crystalline structure, the alloy selected from the group consisting of alloys of AuCu, FePt, FePd, AgTi₃, Pt Zn, PdZn, IrV, CoPt and PdCd (paragraph 313);

An antiferromagnetic layer in contact with the underlayer (figure 17, item 143) and formed of a substantially-chemically-ordered alloy comprising X and Mn and having a tetragonal crystalline structure, wherein X is selected from the group consisting of Pt, Ni, Ir, Pd and Rh (paragraph 313); and

A pinned ferromagnetic (figure 17, item 1443) layer exchange-coupled with the antiferromagnetic layer (paragraphs 315 & 316).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the MR head of Fukuzawa et al with a range of materials to provide for a range of desired outputs and properties.

Regarding claims 2 and 15, Fukuzawa et al disclose:

The structure of claim 1 further comprising a seed layer consisting essentially of Ru or Rh, the underlayer being located on the seed layer (paragraph 260).

Regarding claims 5 and 18, Fukuzawa et al disclose:

The structure of claim 1 wherein the first element listed in each underlayer alloy in the group is present in the alloy in amount between approximately 35 and 65 atomic percent (paragraph 313, (non-subscripted alloys are understood to be 50/50)).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, in the course of routine engineering optimization/experimentation to create the alloy having a ratio within this range. Moreover, absent a showing of criticality, i.e., unobvious or unexpected results, the relationships set forth in claims 5 and 18 are considered to be within the level of ordinary skill in the art.

Additionally, the law is replete with cases in which the mere difference between the claimed invention and the prior art is some range, variable or other dimensional limitation within the claims, patentability cannot be found.

It furthermore has been held in such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves

Art Unit: 2627

unexpected results relative to the prior art range(s); see *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Moreover, the instant disclosure does not set forth evidence ascribing unexpected results due to the claimed dimensions; see *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338 (Fed. Cir. 1984), which held that the dimensional limitations failed to point out a feature which performed and operated any differently from the prior art.

Regarding claims 6 and 19, Fukuzawa et al disclose:

The structure of claim 1 wherein the underlayer alloy comprises Au and Cu and the antiferromagnetic alloy comprises Pt and Mn (paragraph 313).

Regarding claims 7 and 20 and, Fukuzawa et al fail to specifically disclose:

Wherein the thickness of the PtMn alloy antiferromagnetic layer is less than approximately 125 Angstroms.

Regarding claims 8 and 21, Fukuzawa et al fail to specifically disclose:

Wherein the thickness of the AuCu underlayer is between approximately 10 and 200 Angstroms.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made, in the course of routine engineering optimization/experimentation to fabricate the MR sensor with layers of thickness in these ranges. Moreover, absent a showing of criticality, i.e., unobvious or unexpected results, the relationships set forth in claims 7, 8, 20 and 21 are considered to be within the level of ordinary skill in the art.

Additionally, the law is replete with cases in which the mere difference between the claimed invention and the prior art is some range, variable or other dimensional limitation within the claims, patentability cannot be found.

It furthermore has been held in such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range(s); see *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Moreover, the instant disclosure does not set forth evidence ascribing unexpected results due to the claimed dimensions; see *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338 (Fed. Cir. 1984), which held that the dimensional limitations failed to point out a feature which performed and operated any differently from the prior art.

Regarding claim 9, Fukuzawa et al disclose everything repeated from claim 1, further disclosing:

A pinned ferromagnetic layer exchange-coupled with the antiferromagnetic layer (figure 26, Ferro-Magnetic Layer B) having a magnetization direction oriented substantially perpendicular to the plane of the recording medium (figure 26, arrow M^B is perpendicular to the bottom plane where the recording medium is) and substantially prevented from rotating in the presence of magnetic fields from the recording medium (paragraph 21, the antiferromagnetic layers function to pin the ferromagnetic layers);

A free ferromagnetic layer (figure 26, free layer) having a magnetization direction oriented substantially parallel to the plane of the recording medium in the absence of an external magnetic field (figure 26, arrow M'), said free layer magnetization direction

being substantially free to rotate in the presence of magnetic fields (abstract) from the recording medium; and

A nonmagnetic spacer layer between the pinned ferromagnetic layer and the free ferromagnetic layer (figure 26, Non-Magnetic Intermediate Layer).

Claims 4 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al., in view of Tanogami (JP Publication Number JP 2000251226 A).

Regarding claims 4 and 17, Fukuzawa et al. fail disclose:

Wherein the antiferromagnetic alloy further comprises one or more of Cr, Pt, Pd, V, and Ni.

Tanogami discloses:

Wherein the antiferromagnetic alloy further comprises one or more of Cr, Pt, Pd, V, and Ni (Abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to fabricate an antiferromagnetic layer of this material, as this material can improve corrosion resistance and increase resistance.

Claims 10 and 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al., in view of Baumgart (US Patent Number 5287238).

Regarding claim 10, Fukuzawa et al fails to specifically disclose:

Wherein the free layer is located between the substrate and the exchange-coupled structure.

Baumgart et al disclose:

Wherein the free layer is located between the substrate and the exchange-coupled structure (figure 10, item 65 is between items 61 & 69 therefore within the exchange coupled structure).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to place the free layer of Fukuzawa et al's magnetic head between the substrate and the exchange-coupled structure, as taught by Baumgart et al, because this is a well-known variation of the placement of parts which performs the same tasks.

Regarding claim 11, Fukuzawa et al fails to specifically disclose:

Wherein the head is a current-parallel head having the sense current directed substantially parallel to the plane of the free layer.

Baumgart et al disclose:

Wherein the head is a current-parallel head having the sense current directed substantially parallel to the plane of the free layer (figure 10, current source will provide sense current in a loop which will provide parallel currents to the free layer).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the magnetoresistive element of Fukuzawa et al operate by parallel plane current, as taught by Baumgart et al, because it is well known that magnetoresistive elements can operate by this current flow.

Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuzawa et al., in view of Kamijo (US Patent Number 6819532).

Regarding claim 12, Fukuzawa et al fails to specifically disclose:

Wherein the head is a perpendicular-in-the-plane head having the sense current directed substantially perpendicular to the plane of the free layer.

Kamijo discloses:

Wherein the head is a perpendicular-in-the-plane head having the sense current directed substantially perpendicular to the plane of the free layer (column 20, lines 26-42).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the magnetoresistive element of Fukuzawa et al operate by perpendicular plane current, as taught by Kamijo, because this will increase the sensitivity of the head making it more accurate.

Regarding claim 13, Fukuzawa et al fails to specifically disclose:

Wherein the head is a spin-valve head and wherein the nonmagnetic spacer layer is electrically conducting barrier.

Kamijo et al disclose:

Wherein the head is a spin-valve head (column 2, line 44) and wherein the nonmagnetic spacer layer is electrically conducting barrier (column 2, line 46-48).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the CPP head in claim 12 of Fukuzawa et al to be of the spin-valve type with a nonmagnetic conductive spacer layer, as taught by Kamijo,

Art Unit: 2627

because this uses the scattering length of the electrons to conduct and change resistances for a signal reading.

Regarding claim 14, Fukuzawa et al fails to specifically disclose:

Wherein the head is a magnetic tunnel junction head and wherein the nonmagnetic spacer layer is electrically insulating tunnel barrier.

Kamijo discloses:

Wherein the head is a magnetic tunnel junction head and wherein the nonmagnetic spacer layer is electrically insulating tunnel barrier (column 17, lines 38-56).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the CPP head in claim 12 of Fukuzawa et al to be a magnetic tunnel junction element, as taught by Kamijo, because this is a different approach which uses the probability of spin direction of electrons for a more sensitive signal due to lower resistance.

Claim Objection 37 CFR 1.75a

Claims 3 and 16 are objected to under 37 CFR 1.75a for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "one or more of" in claims 3 and 16 is suggested to be replace with the phrase "at least one of" otherwise it is confusing.

Allowable Subject Matter

Claims 3 and 16 would be allowable if rewritten to overcome the objections under 37 CFR 1.75a, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.


Claims 3 and 16 are allowable over the prior art of record because the prior art of record, considered alone or in combination, fail to suggest or teach a combination of the limitations recited in claims 3 and 16.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew G. Kayrish whose telephone number is 571-272-4220. The examiner can normally be reached on 8am - 5pm M-F.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached on 571-272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew G. Kayrish


1/5/2007

1/5/2007


THANG V. TRAN
PRIMARY EXAMINER